AEROLOGICAL OBSERVATIONS

By RICHMOND T. ZOCH

Except for the upper levels at Due West and Ellendale the free-air temperatures were below normal at all levels at all stations. (See Table 1.) The departures were large at Royal Center.

The free-air relative humidities were mostly above normal at Broken Arrow, Due West, and Ellendale and were mostly below normal at Groesbeck and Royal Center. Free-air vapor pressures were mostly below normal at all stations except Ellendale, where they were above normal at nearly all levels.

There were only five airplane observations made during the month at the Seattle (Wash.) Naval Air Station. For this reason no mean was computed and accordingly this station has been omitted from Table 2.

At the surface the resultant winds were northerly for the eastern part of the country and were variable elsewhere. At the 1,000-meter level they were easterly over the southern part of the country, with westerly winds predominating elsewhere. At the 2,500-meter level the resultant winds were westerly all over the country except for the southwestern portion, where they were variable, and extreme southern portion, where they were southerly. At the 4,000-meter level and above, westerly winds predominated over all parts of the country.

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during October, 1930*

TEMPERATURE (° C.)

Altitude (meters) m. s. l.	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	14.0	−2.9	14.3	−1.8	5.0	−2.2	15.9	−3.1	10.5	−2.6
500	13.7	−2.1	13.2	−1.2	5.0	−2.3	16.4	−1.5	9.8	−2.0
1,000	12.8	−1.0	10.6	−1.5	3.9	−2.7	14.7	−1.0	7.0	−2.3
1,500	11.1	−0.7	8.4	−1.5	3.2	−1.8	13.0	−0.7	4.2	−2.7
2,000	8.9	−0.7	6.5	−1.6	1.8	−1.0	10.9	−0.6	1.9	−2.5
2,500	6.2	−0.8	4.6	−1.5	−0.6	−0.9	8.3	−0.9	−0.5	−2.6
3,000	3.2	−1.0	2.7	−1.1	−2.3	+0.2	5.6	−1.3	−2.5	−2.1
4,000	------	------	−1.1	+0.5	−6.4	+1.7	−2.0	−3.9	−7.4	−1.8
5,000	------	------	------	------	−11.6	+1.9	------	------	−12.8	−1.9

TABLE 1.—*Free-air temperatures, relative humidities, and vapor pressures during October, 1930*—Continued

RELATIVE HUMIDITY (%)

Altitude (meters) m. s. l.	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	73	+6	66	0	80	+12	83	+9	69	0
500	67	+4	62	−2	79	+13	65	−3	63	−2
1,000	60	+1	64	+1	72	+14	57	−8	62	0
1,500	55	0	60	+1	59	+6	47	−13	59	+2
2,000	49	−1	54	+2	53	+3	42	−12	52	−1
2,500	48	+2	50	+3	55	+7	45	−3	46	−2
3,000	47	+4	44	0	58	+12	53	+11	43	−2
4,000	------	------	24	−16	57	+12	------	------	48	+6
5,000	------	------	------	------	36	−6	------	------	29	−4

VAPOR PRESSURE (*mb.*)

Surface	12.21	−0.96	11.18	−1.27	8.25	+1.30	15.67	−1.14	9.43	−1.24
500	11.11	−0.60	9.94	−1.05	8.11	+1.24	12.69	−1.89	8.33	−1.08
1,000	9.43	−0.25	8.66	−0.74	6.99	+1.23	9.99	−2.12	6.87	−0.70
1,500	7.67	−0.25	6.82	−0.64	5.42	+0.71	7.43	−2.22	5.43	−0.51
2,000	5.76	−0.32	5.20	−0.43	4.42	+0.53	5.58	−1.73	3.96	−0.71
2,500	4.55	−0.09	4.07	−0.34	3.90	+0.71	4.82	−0.71	2.72	−0.86
3,000	3.63	+0.08	2.97	−0.55	3.61	+1.03	4.66	+0.52	2.16	−0.69
4,000	------	------	0.56	−1.80	2.66	+0.96	------	------	1.47	−0.28
5,000	------	------	------	------	0.62	0.43	------	------	------	------

TABLE 2.—*Free-air data obtained at naval air stations during October, 1930*

Altitude (meters) m. s. l.	Temperature (°C)				Relative humidity (%)			
	Hampton Roads, Va.	Pensacola, Fla.	San Diego, Calif.	Washington, D. C.	Hampton Roads, Va.	Pensacola, Fla.	San Diego, Calif.	Washington, D. C.
Surface	14.2	16.9	19.5	10.6	68	78	63	71
500	12.3	16.8	18.4	10.8	65	69	39	60
1,000	9.3	14.5	18.0	8.7	61	65	42	58
2,000	6.6	10.4	13.4	3.9	45	55	34	54
3,000	2.7	6.3	8.3	0.4	39	45	28	40
4,000	------	------	------	−4.7	------	------	------	21

TABLE 3.—*Free air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during October, 1930*

Altitude (meters) m.s.l.	Broken Arrow, Okla. (233 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (139 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (65 meters)		Key West, Fla. (11 meters)		Los Angeles, Calif. (145 meters)		Spokane, Wash. (606 meters)		Modena, Utah (1,665 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	S 31 E	1.2	S 12 E	1.4	N 73 W	2.8	N 25 E	1.5	N 58 W	2.3	N 52 E	1.2	N 71 W	1.4	N 14 E	2.5	N 62 E	3.1	N 53 W	2.6	S 12 E	1.0	S 73 W	2.6
500	S 10 W	4.3	S 39 W	2.0	------	----	N 42 E	2.3	N 60 W	2.8	S 43 E	4.1	------	----	N 48 E	5.8	N 79 E	6.6	N 65 E	0.7	------	----	------	----
1,000	S 39 W	5.5	N 77 W	3.1	------	----	N 15 E	1.3	N 64 W	5.5	S 18 E	3.4	S 80 W	3.1	N 57 E	3.4	S 83 E	4.8	S 80 E	0.8	S 34 W	2.2	------	----
1,500	S 63 W	4.9	N 74 W	2.6	------	----	N 15 W	3.8	N 54 W	6.8	S 9 W	1.3	N 70 W	4.7	N 20 W	0.5	S 69 E	3.2	S 24 E	1.3	S 53 W	2.6	------	----
2,000	N 77 W	4.7	N 82 W	2.8	N 78 W	4.5	N 58 W	4.0	N 60 W	6.9	N 84 W	1.2	N 73 W	5.0	N 42 W	2.9	S 81 E	1.4	S 72 E	1.2	S 66 W	4.6	N 23 E	0.1
2,500	N 57 W	4.2	N 87 W	3.8	N 87 W	7.9	N 64 W	6.2	N 63 W	5.8	N 43 W	2.4	N 67 W	4.9	N 49 W	3.7	S 16 E	0.5	N 74 E	1.0	S 78 W	5.5	N 61 E	0.7
3,000	S 46 W	3.2	S 62 W	4.8	N 70 W	9.4	N 73 W	6.2	N 65 W	7.5	N 44 W	3.3	N 68 W	6.3	N 68 W	4.8	S 47 W	1.0	N 45 W	1.6	S 82 W	9.2	N 64 W	1.2
4,000	------	----	S 70 W	4.9	N 76 W	9.9	N 75 W	10.1	------	----	N 45 W	5.5	N 73 W	6.3	N 73 W	6.3	N 76 W	3.3	N 56 W	4.0	------	----	N 65 W	4.7
5,000	------	----	------	----	S 73 W	7.6	N 64 W	10.2	------	----	------	----	N 23 W	0.8	N 81 W	9.4	N 74 W	5.7	------	----	------	----	N 54 W	6.8

TABLE 3.—*Free air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during October, 1930*—Continued

	Medford, Oreg. (410 meters)		Memphis, Tenn. (145 meters)		New Orleans, La. (25 meters)		Omaha, Nebr. (321 meters)		Royal Center, Ind. (225 meters)		Salt Lake City, Utah (1,294 meters)		San Francisco, Calif. (2 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D. C. (10 meters)		Phoenix, Ariz. (356 meters)		Brownsville, Tex. (12 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	S 15 E	0.6	N 73 E	0.8	N 53 E	2.0	S 6 W	0.4	S 18 W	0.7	S 36 E	2.2	W	0.4	Calm.	----	S 27 E	1.3	N 38 W	0.5	S 84 E	2.4	N 62 E	0.7
500	S 26 E	0.1	N 65 E	0.7	S 89 E	6.5	S 51 W	2.6	S 50 W	3.4	----------	----	N 29 E	2.3	S 74 W	1.6	S 11 W	3.2	N 26 W	4.4	S 87 E	2.6	S 69 E	5.7
1,000	S 2 W	0.7	S 87 W	0.7	S 74 E	4.3	S 80 W	5.0	S 74 W	3.8	----------	----	N 23 E	4.9	N 76 W	4.2	S 35 W	2.8	N 27 W	5.8	S 60 E	1.9	S 50 E	5.1
1,500	S 31 E	0.7	N 52 W	2.6	S 85 E	2.2	N 85 W	7.0	N 75 W	4.7	S 23 E	2.6	N 2 E	4.4	N 78 W	3.7	S 71 W	1.3	N 25 W	5.1	S 26 E	2.2	S 44 E	3.2
2,000	N 84 W	0.9	N 26 W	2.9	N 27 E	1.6	N 78 W	6.3	N 64 W	5.6	S 20 W	1.2	N 1 W	4.4	N 69 W	5.9	S 40 W	4.3	N 39 W	6.9	S 10 W	0.9	S 37 E	2.3
2,500	S 85 W	2.9	N 14 W	4.3	N 21 E	1.1	N 88 W	7.7	N 74 W	5.9	S 87 W	1.5	N 5 W	5.0	N 80 W	6.5	S 56 W	6.4	N 59 W	6.9	S 21 W	3.3	S 10 E	2.8
3,000	N 68 W	3.9	N 16 E	4.0	N 19 W	2.4	N 78 W	7.8	N 82 W	7.3	N 54 W	2.0	N 1 W	5.2	S 75 W	6.2	S 63 W	8.3	N 42 W	7.2	S 46 W	4.2	S 18 W	2.7
4,000	N 34 W	4.7	----------	----	N 2 W	4.8	----------	----	N 61 W	1.2	N 82 W	4.1	N 17 W	5.5	----------	----	----------	----	----------	----	N 76 W	2.8	S 54 W	5.4
5,000	----------	----	----------	----	----------	----	----------	----	S 39 W	1.4	----------	----	N 30 W	6.3	----------	----	----------	----	----------	----	----------	----	----------	----

TABLE 4.—*Observations by means of kites, captive and limited-height sounding ballons during October, 1930*

	Broken Arrow, Okla.	Due West, S. C.	Ellendale, N. Dak.	Groesbeck, Tex.	Royal Center, Ind.
Mean altitudes (meters) m. s. l., reached during month	2,824	2,653	2,508	2,469	2,716
Maximum altitude (meters) m. s. l., reached and date	[1] 3,978	[2] 4,784	[3] 5,080	[4] 4,233	[5] 4,986
Number of flights made	24	32	31	22	28
Number of days on which flights were made	24	31	29	22	28

[1] 24th. [2] 11th. [3] 8th. [4] 26th. [5] 16th.

In addition to the above there were approximately 130 pilot balloon observations made daily at 56 Weather Bureau stations in the United States.

WEATHER IN THE UNITED STATES

THE WEATHER ELEMENTS

By M. C. BENNETT

GENERAL SUMMARY

Except during the first few days, the first half of October was warmer than usual over the eastern two-thirds of the country, the temperature being especially high in the central and northern regions, while in the western third near normal temperatures prevailed. During the latter half of the month much colder weather prevailed with generally subnormal temperatures from the Mississippi Valley eastward.

The precipitation for October was heavy throughout most of the Plains States and in the west Gulf area, where some sections received from two to six times the monthly normal. The northern Plains, and the northern Rocky Mountain States had much more than the average, and the States just west of the Mississippi River and the east Gulf States received amounts near the normal, while the monthly totals were much below the average in most of the Lake region and from the Ohio Valley eastward. The scantiest falls again occurred in the interior of the Middle Atlantic States, portions of which received less than one-fourth of the October average. The far Southwest and portions of the Great Basin and Pacific Coast States also received scanty precipitation.

TEMPERATURE

October was the first month since January to average cooler than normal over much more than half of the country. Conditions changed considerably from week to week, but for the month no State averaged more than slightly warmer than normal and but few more than moderately cooler than normal.

The first week was cool east of the Mississippi River but warm over most districts to westward, especially in the lower Missouri Valley and the far Northwest. The second week was warmer than normal practically everywhere save west of the Rocky Mountains, and was particularly warm in the north-central portion. From the middle of the month onward cool weather predominated, except in the far Southwest. A marked cold period visited Montana and the Dakotas late in the middle decade of the month and passed southeastward to the Atlantic coast by the first portion of the final decade. In addition, the closing days of October were quite cold in the north-central portion of the country.

The month averaged cooler than normal in most regions, especially in the southern Appalachian area, in Indiana and adjacent districts, and from the central portions of the Dakotas westward to the Cascade Mountains. A large part of Montana averaged more than 4° colder than normal.

Portions of California and of the Rio Grande Valley averaged warmer than normal, also some parts of the Lake region and New England.

The highest temperatures in the far Northwest were noted early in the month, but in most States west of the Mississippi late in the first decade. From the central valleys northeastward and eastward the highest marks were reached usually during the period from the 11th to the 14th, and in a few States they were close to the previous records of October high temperatures.

The lowest marks were reached about the 17th in the northern portions of the Plains and the Rocky Mountains, and about the 22d in the majority of States east of the Mississippi River. Several States of the upper Ohio Valley, or the middle or south Atlantic coast equaled or very closely approached their previous October records at this time. In some of the Southeastern States and in most of the States west of the Mississippi River the lowest marks occurred during the last six days of October.